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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/681,894	06/21/2001	Roderick A. B. Devine	PRS075	2985

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KENNTH E CALLAHAN  
377 ABW/JAN  
2251 MAXWELL SE  
KIRTLAND AFB, NM 87117

EXAMINER

COLEMAN, WILLIAM D

ART UNIT

PAPER NUMBER

2823

DATE MAILED: 08/01/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

# Office Action Summary

Application No.

09/681,894

Applicant(s)

DEVINE ET AL.

Examiner

W. David Coleman

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

## Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☒ Responsive to communication(s) filed on 27 May 2003.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 1-12 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-12 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

## Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

## Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_

## DETAILED ACTION

### *Response to Arguments*

1. Applicant's arguments filed May 27, 2003 have been fully considered but they are not persuasive.
2. Applicants contend that the prior art rejection of Kizilyalli et al., "Deuterium Post-Metal Annealing of MOSFET's for Improved Hot Carrier Reliability", IEEE, Electron Device Letters, vol. 18, no. 3, March 1997 in view of Gary et al., U.S. Patent 6,328,801 B1 herein known as Kizilyalli and Gary fail to teach Applicants invention because neither reference uses the term "radiation hardening".
3. In response to Applicants contention that the combined references fail to teach radiation hardening, Applicants are directed to pages 1-3 where Applicants background and summary of invention teaches a silicon based semiconductor microcircuit is radiating hardened by replacing the standard finished circuit anneal process by heating the microcircuit in a vacuum furnace to remove any hydrogen in the microcircuit structure and annealing the microcircuit with deuterium containing forming gas (see [0007]).
4. The specification need not describe the equivalents of the structures, material, or acts corresponding to the means-(or step-) plus-function claim element. See *In re Noll*, 545 F.2d 141, 149-50, 191 USPQ 721, 727 (CCPA 1976) (the meaning of equivalents is well understood in patent law, and an applicant need not describe in his specification the full range of equivalents of his invention) (citation omitted). Cf. *Hybritech Inc. v. Monoclonal Antibodies, Inc.*, 802 F.2d 1367, 1384, 231 USPQ 81, 94 (Fed. Cir. 1986) ("a patent need not teach, and preferably omits, what is well known in the art").

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5. Where, however, the specification is silent as to what constitutes equivalents and the examiner has made out a prima facie case of equivalence, the burden is placed upon the applicant to show that a prior art element which performs the claimed function is not an equivalent of the structure, material, or acts disclosed in the specification. See *In re Mulder*, 716 F.2d 1542, 1549, 219 USPQ 189, 196 (Fed. Cir. 1983).

6. If the applicant disagrees with the inference of equivalence drawn from a prior art reference, the applicant may provide reasons why the applicant believes the prior art element should not be considered an equivalent to the specific structure, material or acts disclosed in the specification. Such reasons may include, but are not limited to:

- (A) Teachings in the specification that particular prior art is not equivalent;
- (B) Teachings in the prior art reference itself that may tend to show nonequivalence; or
- (C) 37 CFR 1.132 affidavit evidence of facts tending to show nonequivalence.

***Claim Rejections - 35 USC § 103***

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

8. Claims 1-5 and 7-11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kizilyalli et al., "Deuterium Post-Metal Annealing of MOSFET's for Improved Hot Carrier Reliability", IEEE Electron Device Letters, vol. 18, No. 3, March 1997, pp. 81-83 in view of Gary et al., U.S. Patent 6,328,801 B1.

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9. Pertaining to claims 1, 7, 11, 12 and 13, Kizilyalli discloses a semiconductor process substantially as claimed. See Abstract where Kizilyalli teaches a silicon-based microcircuit radiation hardening method comprised of:

heating the microcircuit in a furnace to remove any hydrogen in the microcircuit structure; and

annealing the microcircuit with deuterium containing forming gas. However, Kizilyalli fails to teach annealing in a vacuum furnace. Gary teaches a semiconductor process of annealing semiconductor devices in a vacuum furnace. In view of Gary, it would have been obvious to one of ordinary skill in the art to incorporate the vacuum furnace of Gary into the Kizilyalli semiconductor process because the invention makes the use of deuterium in the mass production of semiconductor devices, commercially feasible (Abstract of Gary, last sentence).

10. Pertaining to claims 2, 3, 4, 5, 8, 9, 10, 11, given the teaching of the references, it would have been obvious to determine the optimum thickness, temperature as well as condition of delivery of the layers involved. See *In re Aller, Lacey and Hall* (10 USPQ 233-237) "It is not inventive to discover optimum or workable ranges by routine experimentation. Note that the specification contains no disclosure of either the critical nature of the claimed ranges or any unexpected results arising therefrom. Where patentability is said to be based upon particular chosen dimensions or upon another variable recited in a claim, the Applicant must show that the chosen dimensions are critical. *In re Woodruff*, 919 f.2d 1575, 1578, 16 USPQ2d 1934, 1936 (Fed. Cir. 1990).

Any differences in the claimed invention and the prior art may be expected to result in some differences in properties. The issue is whether the properties differ to such an extent that

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the difference is really unexpected. *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986)

Appellants have the burden of explaining the data in any declaration they proffer as evidence of non-obviousness. *Ex parte Ishizaka*, 24 USPQ2d 1621, 1624 (Bd. Pat. App. & Inter. 1992).

An Affidavit or declaration under 37 CFR 1.132 must compare the claimed subject matter with the closest prior art to be effective to rebut a prima facie case of obviousness. *In re Burckel*, 592 F.2d 1175, 201 USPQ 67 (CCPA 1979).

11. Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kizilyalli et al., "Deuterium Post-Metal Annealing of MOSFET's for Improved Hot Carrier Reliability", IEEE Electron Device Letters, vol. 18, No. 3, March 1997, pp. 81-83 in view of Gary et al., U.S. Patent 6,328,801 B1 as applied to claims 1, 7, 11, 12 and 13 above, and further in view of Warren et al., U.S. Patent 6,159,829.

12. The combined teachings of Kizilyalli and Gary discloses a semiconductor process substantially as claimed. However, the combined teachings fail to disclose wherein the microcircuit includes EEPROM devices. Warren teaches fabricating EEPROM devices. In view of Warren, it would have obvious to one of ordinary skill in the art to incorporate the EEPROM of Warren into the combined teachings of Kizilyalli and Gary because the process can be utilized in a non-volatile NVFET memory device (column 5, lines 4-58).

13. Claim 12 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kizilyalli et al., "Deuterium Post-Metal Annealing of MOSFET's for Improved Hot Carrier Reliability", IEEE Electron Device Letters, vol. 18, No. 3, March 1997, pp. 81-83 in view of Lyding et al., U.S. Patent 5,872,387.

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14. Kizilyalli discloses a semiconductor process substantially as claimed. Kizilyalli teaches a radiation hardened silicon-based semiconductor microcircuit prepared by a process comprised of:

15. Fabricating the microcircuit using standard techniques of silicon-based microelectronics except that deuterium is substituted for hydrogen in any fabrication step that involves hydrogen gas or hydrogen-containing species. However, Kizilyalli fails to teach heating the microcircuit in a vacuum. Lyding teaches heating the microcircuit in a vacuum. See column 4, lines 63-68 where Lyding teaches deuterium annealing at sub-atmospheric pressures. In view of Lyding, it would have been obvious to one of ordinary skill in the art to incorporate the process steps of Lyding into the Kizilyalli semiconductor process because the invention is beneficial for preparing radiation hard devices (column 2, lines 48-49).

#### ***Conclusion***

16. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a).

Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

17. A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

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18. Any inquiry concerning this communication or earlier communications from the examiner should be directed to W. David Coleman whose telephone number is 703-305-0004.

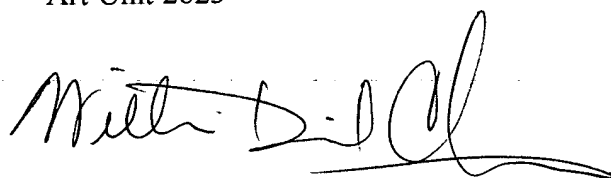
The examiner can normally be reached on 9:00 AM-5:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Olik Chaudhuri can be reached on 703-306-2794. The fax phone numbers for the organization where this application or proceeding is assigned are 703-308-7722 for regular communications and 703-308-7721 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0956.

W. David Coleman  
Primary Examiner  
Art Unit 2823

WDC  
July 25, 2003

A handwritten signature in black ink, appearing to read 'W. David Coleman', with a long horizontal flourish extending to the right.